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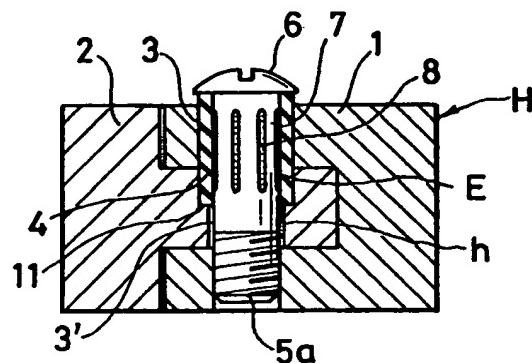
(56) Documents cited
GB 0847439 GB 0781819

(58) Field of search
E2F
G2J

(54) Hinge mechanism employed
to those products such as glasses

(57) A hinge mechanism employed in products such as glasses and lighters wherein a bore into which a set screw 5a is inserted and penetrating through female and male pieces engaged with each other has a large diameter portion extending through the first female piece and till halfway the male piece next or last a hollow member 4 made of rubber or plastics is inserted into the larger diameter portion of said bore, the set screw is inserted through the hollow member and screwed into the last female piece to thereby press the hollow member by the screw head. The set screw is provided with recesses 8 on its rod, if necessary, to hold lubricating oil therein, so that the condition of enabling the set screw to be prevented from becoming loose and the hinge to be opened and closed with appropriate tightness can be lasted long time.

FIG. 10



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FIG. 1

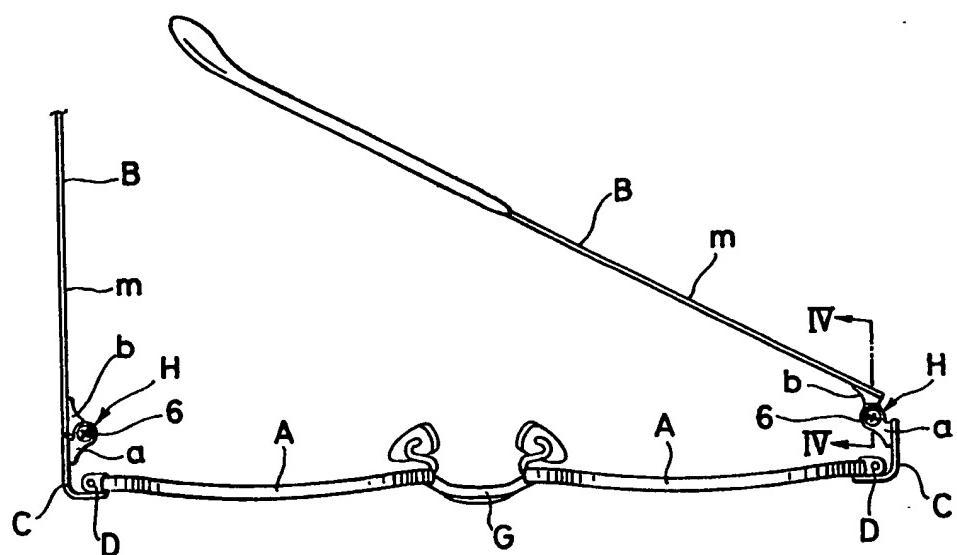


FIG. 2

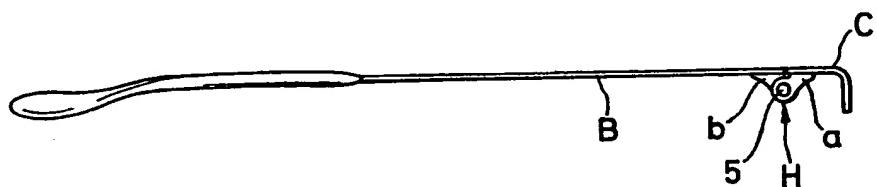
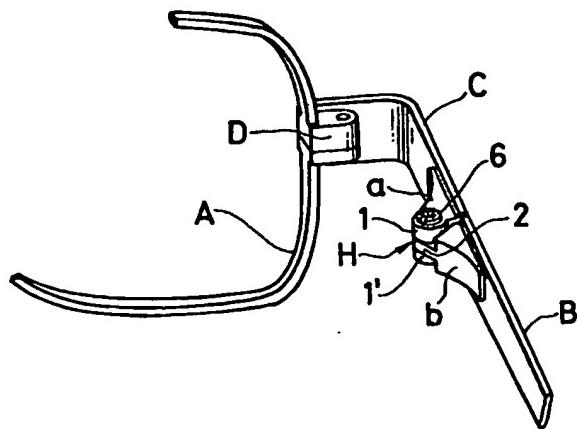


FIG. 3



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FIG. 4

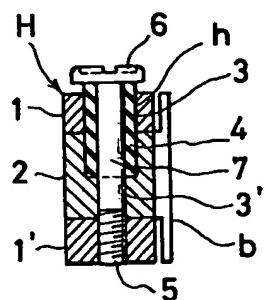


FIG. 5

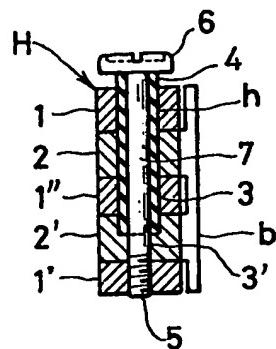


FIG. 6

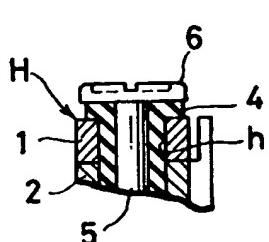


FIG. 7

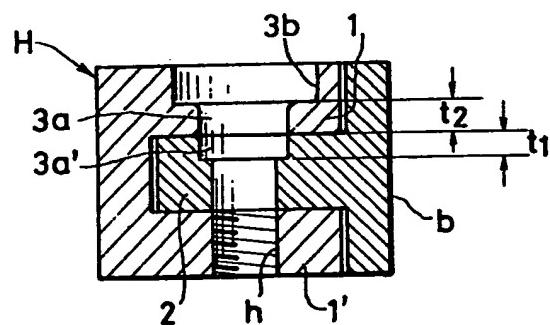


FIG. 8

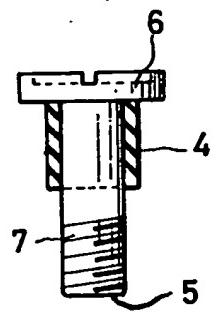
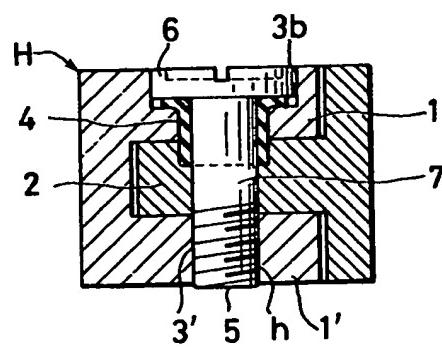


FIG. 9



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FIG. 10

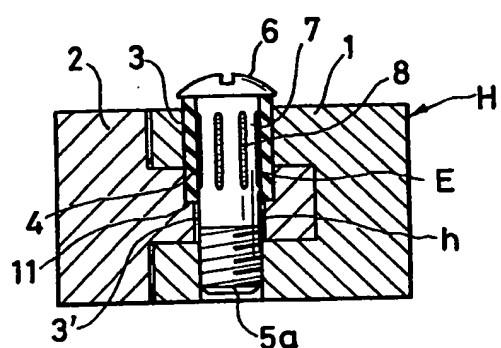


FIG. 11

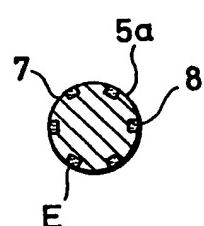


FIG. 12

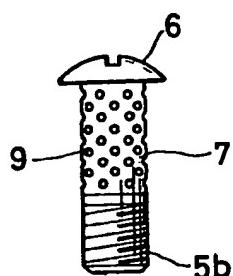


FIG. 13

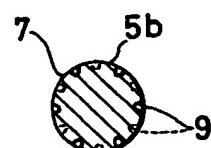
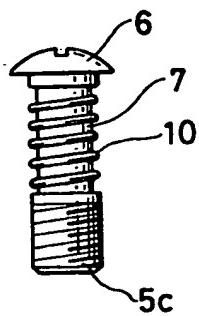


FIG. 14



SPECIFICATION

Hinge mechanism employed to those products such as glasses

- 5 Although they are small in size and volume, hinges for coupling bows to the lens frame of glasses are subjected to large force whenever the bows are erected, and the hinge mechanism becomes loose inevitably as the bows are repeatedly erected. The loosening of said hinge mechanism is a problem to be prevented and solved.
- If it is intended only to prevent set screws 15 in the hinges from falling off, front ends of these set screws may be collapsed appropriately after having been set in the hinges. Upon erecting the bows, however, the hinges of glasses must have tightness or holding as 20 well as smoothness. The hinge mechanism made of metal only can not meet these demands.
- There has been proposed a hinge having an elastic hollow member interposed at that portion where its hinge body is contacted with its 25 set screw. However, the elastic hollow member repeatedly subjected to stress every time when the bows are erected is likely to break and when it breaks, the hinge mechanism 30 becomes loose or broken. The hinge of this type is therefore short in life.
- The hinges employed to the glasses, for example, are ideal when they enable the bows to be erected with appropriate friction as well 35 as with smoothness and this smooth and appropriate frictional erecting of the bows to be kept long time. The present invention is intended to eliminate the drawback caused by the hinge mechanism of elastic hollow member type, and to provide a small-sized hinge 40 mechanism employed to those products such as glasses and lighters and excellent in construction and function and capable of being made in mass production without any increase 45 of cost.
- The present invention relates to a small-sized hinge mechanism employed to those products such as glasses and lighters and enabling the set screw in the hinge mechanism to be prevented from falling off and the bows of glasses to be erected with appropriate 50 tightness, along with smoothness, wherein a bore extending through female and male pieces engaged with each other and into 55 which the set screw is inserted is made larger in diameter through the first female and till halfway the male piece next or last; a hollow member made of rubber or plastics is arranged in this larger-diameter portion of said 60 bore; the set screw is inserted through the hollow member and screwed into the last female piece to such an extent that the hollow member is pressed by the screw head; and lubricating oil is kept, if necessary, in recesses 65 formed on the outer circumference of the

screw rod, whereby the bows of glasses can be erect with appropriate tightness as well as with smoothness and this smooth and appropriately tight erecting of the bows can be guaranteed long time.

An object of the present invention is to provide a small-sized hinge mechanism capable of preventing the set screws from becoming loose and falling off even after it is used long time.

Another object of the present invention is to provide a hinge mechanism employed particularly to connect the bows with the lens frame of glasses and enabling the bows to be erected with appropriate tightness as well as with smoothness.

A further object of the present invention is to provide a small-sized hinge mechanism employed to those products such as glasses and lighters and excellent in durability.

A still further object of the present invention is to provide a small-sized hinge mechanism capable of holding lubricating oil and thus making it unnecessary to feed oil.

A still further object of the present invention is to provide a small-sized hinge mechanism simple in construction and capable of being made in mass production.

These and other objects of the present 95 invention can be achieved by a hinge mechanism embodied according to the present invention. Some preferred embodiments of the present invention will be described in detail referring to the accompanying drawings. It

100 should be understood, however, that any changes and modifications relating to the details of arrangement embodied according to the present invention will be included in the scope of claims appended hereto.

105 *Figure 1* shows an example of hinge mechanism according to the present invention attached to the glasses.

Figure 2 shows a portion of the bow in Fig. 1 viewed from underside.

110 *Figure 3* is an enlarged perspective view showing the hinge mechanism in Fig. 1.

Figure 4 is an enlarged sectional view taken along a line IV-IV in Fig. 1 wherein the number of female and male pieces engaged 115 with each other is three.

Figure 5 is a view similar to Fig. 4 wherein the number of female and male pieces engaged with each other is five.

120 *Figure 6* is an enlarged view showing a set screw screwed into the examples of hinge mechanism shown in Figs. 4 and 5.

Figure 7 is a sectional view showing another example of hinge mechanism wherein the number of female and male pieces engaged with each other is three.

125 *Figure 8* is a front view showing the set screw in Fig. 7 inserted through an elastic hollow member.

Figure 9 is a sectional view showing the set 130 screw in Fig. 8 screwed into the hinge mecha-

nism shown in Fig. 7.

Figure 10 is a sectional view showing a set screw provided with lubricating oil recesses and included in the hinge mechanism according to the present invention.

Figure 11 is an enlarged cross sectional view showing the rod portion of said set screw shown in Fig. 10.

Figure 12 is a front view showing another example of set screw provided with lubricating oil recesses.

Figure 13 is an enlarged cross sectional view showing the rod portion of said set screw shown in Fig. 12.

Figure 14 is a front view showing a further example of set screw provided with lubricating oil recesses.

Fig. 1 shows an example of hinge mechanism according to the present invention attached to glasses wherein (A) represents lens frames of glasses (G), (B) bows thereof, and the bows (B) are attached to attachments (C) of said lens frames (A), respectively, through hinges (H). Fig. 2 shows a piece of bow viewed from underside. Fig. 3 is a perspective view showing in an enlarged scale the main portion of said glasses in Fig. 1. In Figs. 1, 2 and 3, (a) represents a mount of female pieces (1), (1') of said hinge (H) which will be described later, (b) a mount of male piece (2) which will also be described later, and (5) a set screw. (D) denotes lens locking metals, which may have same arrangement as the hinge mechanism of the present invention.

Fig. 4 is a sectional view taken along a line IV-IV in Fig. 1 and showing the hinge mechanism according to the present invention. The number of said female and male pieces (1), (1') and (2) engaged with each other is three.

A bore (h) penetrating through these female and male pieces and into which a set screw (5) is inserted has a larger diameter portion (3) extending through the first female piece (1) and till halfway the male piece (2), and a smaller diameter portion (3') further extending from the larger diameter portion (3) through the remaining of said male piece (2) and the last female piece (1'). An elastic hollow member (4) made of rubber or plastics is fitted into the larger diameter portion (3) of said bore (h). The set screw (5) is inserted through the elastic hollow member (4) and screwed into the last female piece (1') to such an extent that the elastic hollow member (4) is pressed

and fixed by the underside of a screw head (6). The mounts (a) and (b) of said female and male pieces (1), (1') and (2) are welded to the bow (B) and the attachment (C) of the lens frame (A), as shown in Figs. 1, 2 and 3.

It may be arranged that the elastic hollow member (4) is made a little longer than the length of said larger diameter portion (3) to project outside from the first female piece (1) and that this projected portion of said elastic hollow member (4) is forcedly spread outward

by the screw head (6), which is larger in diameter than the elastic hollow member (4), and sandwiched between the first female piece (1) and the screw head (6) (see Fig. 6).

With a hinge mechanism in which the number of said female and male pieces (1), (1'), (1'') and (2') is five, the larger diameter portion (3) of said bore (h) extends till halfway the second male piece (2') (see Fig. 5).

According to the embodiments of the present invention shown in Figs. 4 through 6, the elastic hollow member (4) inserted into the larger diameter portion (3) of said bore (h) is forcedly pushed into there by the screw head (6) to thereby have repulsive force, which serves to push out the screw head (6), thus enabling a close contact to be established between female and male threads of said female piece (1') and set screw (5).

In addition, the elastic hollow member (4), the set screw (5) and the bore wall of said male piece (2) are closely contacted, without clearance, with one another, so that the bow (B) can be erected and folded with steadiness as well as with smoothness. Further, the male piece (2) is contacted directly with the set screw (5) except at the larger diameter portion (3). The bow (B) can be thus swingingly erected and folded with lightness, preventing that portion (m) of said bow (B) which is made of metal from bending at the time when the bow (B) is swingingly erected and folded.

According to a hinge mechanism shown in Fig. 7, the larger diameter portions of said bore (h) which are denoted by a (3a) and (3a') extend through the female piece (1) and till halfway the male piece (2). However, these larger diameter portions are made the largest in diameter at the starting area of said bore (h) in the first female piece (1) so that the screw head (6) may be housed in the largest diameter portion (3b). The depth (t_1) of said larger diameter portion (3a') in the male piece (2) is made equal to or smaller than the depth (t_2) of said larger diameter portion (3a) in the female piece (1). The screw rod (7) is inserted into the elastic hollow member (4), which is made of rubber or plastics and which is longer than the sum ($t_1 + t_2$) of depths of said larger diameter portions (3a) and (3a') in the female and male pieces (1) and (2), and then screwed into the last female piece (1') so as to combine the female pieces (1) and (1') with the male piece (2), as shown in Fig. 9.

The outer diameter of said larger diameter portions (3a) and (3a') in the female and male pieces (1) and (2) is substantially equal to that of said elastic hollow member (4) while the length of said elastic hollow member (4) is made larger than the sum of depths of said larger diameter portions (3a) and (3a'). When the set screw (5) is screwed into the last female piece (1') as shown in Fig. 9, therefore, the elastic hollow member (4) is pressed

by the underside of said screw head (6) and

pushed into between the set screw (5) and the wall of said larger diameter portions (3a) and (3a'). In addition, the upper end of said elastic hollow member (4) is pressed and spread outward by the screw head (6) to serve as if like a spring washer.

In other words, the elastic hollow member (4) is pushed to closely contact the screw rod (7) as well as the inner wall of said larger diameter portions (3a) and (3a'). In addition, the upper end of the said elastic hollow member (4) is kept contacted closely with the underside of said screw head (6) and the bottom of said largest diameter portion (3b). As the result, the set screw (5) can be prevented from becoming loose and falling off, thus enabling the bows to be erected and folded with appropriate tightness as well as with smoothness.

The hinge mechanism shown in Fig. 9 has a merit of good appearance because the screw head (6) is not projected outside from the first female piece (1).

Fig. 10 shows a set screw (5a). The screw (5a) has a plurality of longitudinal recesses (8) formed on its rod (7) which corresponds to the larger diameter portion (3) of said bore (h). The screw rod (7) provided with the longitudinal recesses (8) is closely fitted into the elastic hollow member (4), made of rubber or plastics and a little longer than the larger diameter portion (3). Oil component (E) is held between the longitudinal recesses (8) of said screw rod (7) and the elastic hollow member (4). The set screw (5a) thus oiled is screwed into the bore (h) of said hinge (H).

Fig. 11 is a cross sectional view showing the rod (7) of said set screw (5a) shown in Fig. 10. Fig. 12 shows a further set screw (5b) whose rod (7) is provided with a plurality of dot recesses (9). Fig. 13 is a cross sectional view showing the rod (7) of said set screw (5b). Fig. 14 shows a still further set screw (5c) whose rod (7) has a threaded portion (10).

Holding of oil between the elastic hollow member (4) and the rod (7) of said set screw (5a), (5b) or (5c) which is closely fitted into the elastic hollow member (4) is achieved in such a way that the set screw (5a), (5b) or (5c) fitted into the elastic hollow member (4) is put in an oil vessel and that the oil is heated to about 50°C. When the oil is heated to this temperature, air between the screw rod (7) and the elastic hollow member (4) is expanded to escape therefrom so that oil component (E) can be allowed to come into between the screw rod (7) and the elastic hollow member (4). When the set screw (5a), (5b) or (5c) thus oiled is screwed into the hinge (H) (see Fig. 10), the lower end of said elastic hollow member (4) is supported by a step (11) of said larger diameter portion (3). In addition, the elastic hollow member (4), longer than the larger diameter portion (3), is

pushed by the underside of said screw head (6). Therefore, the inner face of said elastic hollow member (4) is forced to come into the recesses on the screw rod (7) to thereby urge oil component (E) out of the recesses. Oil component (E) thus urged flows to the smaller diameter portion (3') of said bore (h) while to the joint between the male and female pieces (2) and (1) to form an oil film all over the joint, so that the male piece (2) can be rotated with excellent smoothness.

The embodiments shown in Figs. 10 through 14 enable oil film to be easily formed on the contacted faces between the male and female pieces, without using any lubricator, which is otherwise used. With the conventional small-sized hinges employed to those products such as glasses and lighters, the contacted faces between the male and female pieces are lubricated by the lubricator like an injector to allow the hinges to be opened and closed smoothly. However, each of clearances between the male and female pieces is extremely narrow. Therefore, lubrication to oil the whole of contacted faces between the male and female pieces is very troublesome, time-wasting, and not sufficient enough.

Particularly with the hinges of glasses, at least three times of lubrication are needed before processing is started with the set screws screwed, after plating, and at the time of final adjusting. When the embodiments shown in Figs. 10 through 14 are employed, however, it is sufficient only by welding the hinges to the bows; putting them in the oil vessel and heating the oil to about 50°C. When the oil is heated to this temperature, oil component comes into between the elastic hollow members and the screw rods to be held in the recesses on the screw rods. When the set screws are then fastened, therefore, oil component comes into the contacted faces between the male and female pieces to thereby form oil film thereon. As described above, lubrication to the hinge mechanism can be achieved in this simple manner that a plurality of the bows of glasses with the small-sized hinges attached or the small-sized hinges themselves are put in the oil vessel and that the oil is heated. Therefore, production efficiency can be increased, producing the hinges which can be opened and closed smoothly because their male and female pieces can be lubricated sufficiently between their contacted faces.

CLAIMS

1. A hinge mechanism employed to those products such as glasses characterized in that a bore penetrating through female and male pieces of said hinge mechanism engaged with each other and into which a set screw is inserted has a larger diameter portion extending through the first female piece and till halfway the male piece next, or last that an

- lastic hollow member made of rubber or plastics is inserted into the larger diameter portion of said bore, and that the set screw is fitted into the elastic hollow member and
- 5 screwed into the last female piece to press the elastic hollow member by the underside of head of said screw.
2. A hinge mechanism according to claim 1 wherein said larger diameter portion of said
- 10 bore extending through the first female piece and till halfway the male piece next and into which the set screw is inserted is made substantially equal in inner diameter to the outer diameter of said elastic hollow member into
- 15 which the set screw is fitted; said larger diameter portion is made the largest at the starting area of said bore in the first female piece so as to house the screw head; the depth of said larger diameter portion in the
- 20 male piece is made equal to or smaller than that of said larger diameter portion in the first female piece; the rod of said set screw is fitted into the elastic hollow member which is made of rubber or plastics and which is longer
- 25 than the sum of depths of said larger diameter portions in the first female piece and in the male piece next; and said set screw with the elastic hollow member fitted around is screwed into the last female piece to combine
- 30 said female pieces with the male piece.
3. A hinge mechanism according to claim 1 wherein the bore into which the set screw is inserted and extending through the first female piece and till halfway the male piece
- 35 next or last is made larger in diameter than the screw rod so as to allow the elastic hollow member fitted around the screw rod to be inserted into the larger diameter portion of said bore; the set screw is provided with
- 40 recesses on its rod which corresponds to the larger diameter portion of said bore; the elastic hollow member which is longer than the larger diameter portion of said bore is closely fitted around the recessed rod of said set
- 45 screw so as to hold oil between the screw rod and the elastic hollow member; and the set screw thus arranged and oiled is screwed into the female and male pieces.
4. A hinge mechanism as claimed in claim
- 50 1 and substantially as herein described with reference to and/or as illustrated in the accompanying drawings.